![COE Centers of Excellence for Labor Market Research logo]

Solar Technicians

Inland Empire/Desert Region (Riverside and San Bernardino counties combined)

This workforce demand report uses state and federal job projection data that was developed before the economic impact of COVID-19. The COE is monitoring the situation and will provide more information as it becomes available. Please consult with local employers to understand their current employment needs.

Summary

- Employment for *solar photovoltaic installers* is expected to **increase by 28% between 2019 and 2024** in the Inland Empire/Desert Region. A total of **118 annual job openings** will be available each year over the five-year timeframe.

- The 50th percentile, median hourly wage for *solar photovoltaic installers* is **$19.03, below the $21.78 per hour self-sustainable hourly wage** estimate for a single adult with one child. The median hourly wage is above the $18 per hour "good wage," but only if the job offers benefits.

- Over the last three academic years, there was one credential issued from a regional community college training program related to energy systems technology.

- The COE recommends creating new or expanding existing energy systems technology programs. Please see the Recommendation section for more detail.

Introduction

This report provides data on the occupation and program most closely related to solar technicians. The California Community College energy systems technology (TOP 0946.10) program prepares students for employment as solar technicians through the instruction of theory and methods of energy conservation applied to heating, cooling, and related systems, including the measurement and assessment of energy consumption, diagnosis and prescription. This program includes alternative energy systems (Taxonomy of Programs, 2012). The description and a sample of job titles for *solar photovoltaic installers* are listed below.

Solar Photovoltaic Installers (SOC 47-2231)
Assemble, install, or maintain solar photovoltaic (PV) systems on roofs or other structures in compliance with site assessment and schematics. May include measuring, cutting, assembling, and bolting structural framing and solar modules. May perform minor electrical work such as current checks.

Sample job titles: Installer, Photovoltaic Installer (PV Installer), PV Design and Installation Technician, Solar Designer/Installer, Solar Installer, Solar Installer Technician, Solar Photovoltaic Installer (Solar PV Installer), Solar Technician

Entry-Level Educational Requirement: High school diploma or vocational training
Training Requirement: Between one and twelve months on-the-job training
Work Experience Required: None
Incumbent workers with a Community College Award or Some Postsecondary Coursework: 30%

Job Opportunities

In 2019, there were 599 *solar photovoltaic installer* jobs in the Inland Empire/Desert Region (IEDR). This occupation is projected to increase employment by 28% through 2024. Employers in the region will need to hire 588 workers over the next five years, or 118 workers annually, to fill new jobs and backfill jobs that workers are permanently vacating (includes occupational transfers and retirements). Exhibit 1 displays five-year projected job growth, and Exhibit 2 displays historical and projected jobs for *solar photovoltaic installers* in the IEDR.

Exhibit 1: Five-year projections for solar photovoltaic installers

2019 Jobs	2024 Jobs	5-Yr % Change (New Jobs)	5-Yr Openings (New + Replacement Jobs)	Annual Openings (New + Replacement Jobs)	% of workers age 55+
599	769	28%	588	118	12%

Source: EMSI 2020.3

Exhibit 2: Historical and projected solar photovoltaic installers jobs in the IEDR, 2014 – 2024
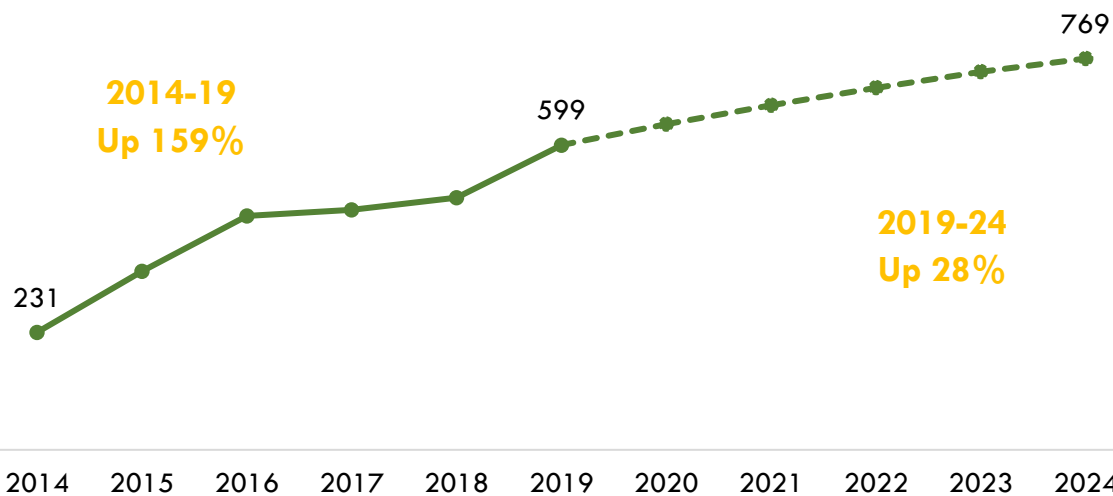
Source: EMSI 2020.3

Job Postings

Exhibit 3 displays the number of job ads posted during the last 12 months, along with the regional and statewide average time to fill for *solar photovoltaic installers*. On average, local employers fill online job postings for *solar photovoltaic installers* within 48 days. This regional average is nine days shorter than the statewide average of 57 days, indicating that local employers face fewer challenges than other employers in California when looking to fill open positions.
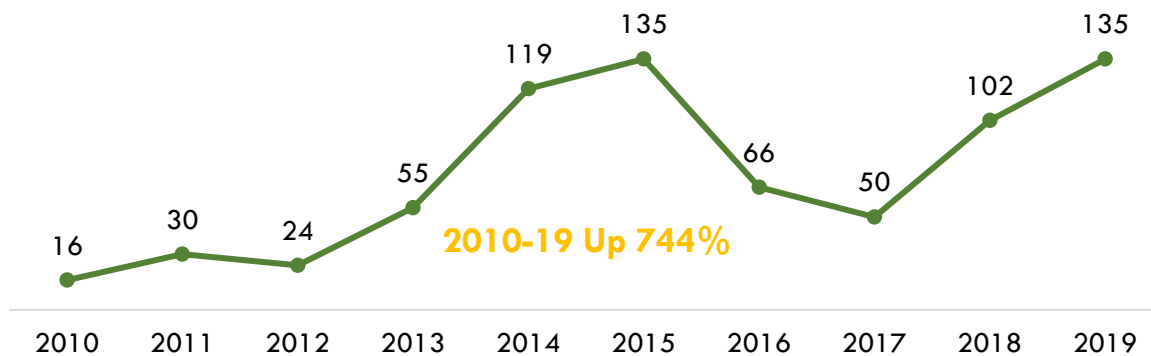
Exhibit 3: Job ads and time to fill, Aug 2019 – Jul 2020

Job Ads	Regional Average Time to Fill (Days)	California Average Time to Fill (Days)
180	48	57

Source: Burning Glass – Labor Insights

Exhibit 4 displays the number of online job postings for *solar photovoltaic installers* in the IEDR between 2010 and 2019. While job postings for this occupation dropped significantly from 2015 to 2017, demand appears to be rebounding, with 180 job postings from the last 12 months and 97 job postings listed in 2020 alone.

Exhibit 4: Solar photovoltaic installer job ads in the IEDR, 2010 – 2019

2010-19 Up 744%

| 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 |
| 16 | 30 | 24 | 55 | 119 | 135 | 66 | 50 | 102 | 135 |

Source: Burning Glass – Labor Insights

Earnings

Community colleges should ensure their training programs lead to employment opportunities that provide a self-sustainable level of income. The Brookings Institute in their Advancing Opportunity in California's Inland Empire report found that a "good job" wage in the region is above $18.00 per hour, or $37,440 per year (Shearer, Shah & Gootman, p. 25). The Family Needs Calculator estimates that a self-sustainable wage for a single adult with one school-age child is $21.78 per hour or $45,992 annually (Pearce & Manzer, 2020).

The median wage for *solar photovoltaic installers* surpasses the Brookings Institute's "good job" wage. Despite this, this wage is below the Family Needs Calculator self-sustainability rate. Wages for *solar photovoltaic installers* do not exceed the self-sustainability rate until at the experienced-level. Exhibit 5 displays the IEDR hourly earnings for this occupation.

Exhibit 5: Hourly earnings for solar photovoltaic installers
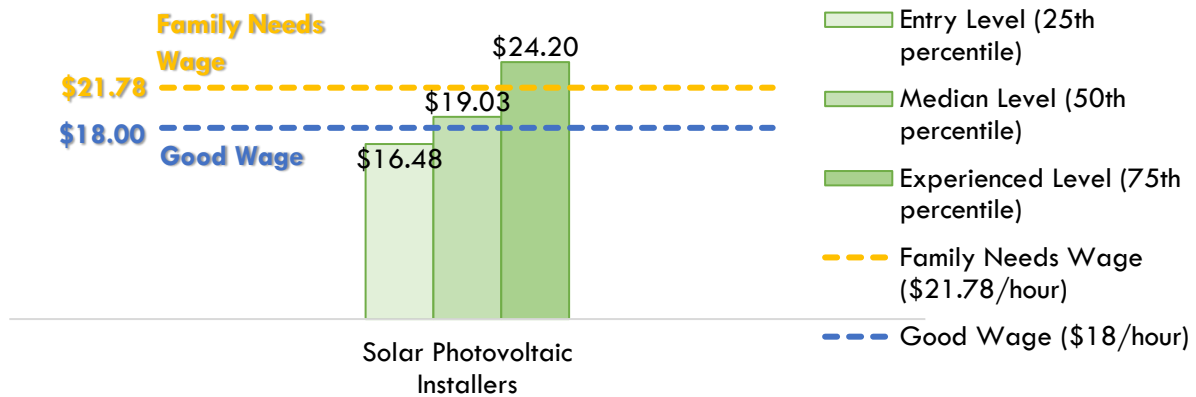
Source: EMSI 2020.3

According to occupational guides developed by the California Labor Market Information Division, benefits for *solar photovoltaic installers* vary based on employer size, with larger employers more likely to offer benefits such as medical, dental, life, and vision insurance (Occupational Guides, 2020).

Advertised Salary

Exhibit 6 displays advertised salary data from *solar photovoltaic installer* job postings over the last 12 months. Advertised salary information reveals that employers are willing to pay *solar photovoltaic installers* $45,000 annually, which is above the $37,440 per year established as a "good job" wage by the Brookings Institute in their Advancing Opportunity in California's Inland Empire report (Shearer, Shah & Gootman, p. 25). Please note that salary figures are prorated to reflect full-time, annual wage status.

Exhibit 6: Advertised salary information, Aug 2019 – Jul 2020

Real-Time Salary Information					
Job Title	Number of job postings	Less than $35,000	$35,000 to $49,999	$50,000 to $74,999	More than $75,000	Average Annual Salary
Solar Photovoltaic Installers	90	8%	75%	14%	3%	$45,000

Source: Burning Glass – Labor Insights

Employers, Skills, Education, and Work Experience

Exhibit 7 displays the employers that posted the most job ads for *solar photovoltaic installers* over the last 12 months in the IEDR.

Exhibit 7: Employers posting the most job ads for solar photovoltaic installers, Aug 2019 – Jul 2020

Employers (Cities)	Job Ads
Sunrun (Redlands, Murrieta, Riverside, San Bernardino)	25
Vivint Solar (Riverside, Apple Valley)	8
JDC Energy Systems (Rancho Cucamonga)	7
Wavsys (Ontario)	4
Sunsytem Technology (Fontana)	4
Semper Solaris (Riverside)	4
Progressive Energy Solutions (Redlands, Yucaipa)	4
Penguin Home Solutions (Riverside)	4
Grid Alternatives (Riverside)	4
Total for all other employers	*116*
Total	**180**

Source: Burning Glass – Labor Insights

Exhibit 8 displays a sample of specialized and employability skills that employers are seeking when looking for workers to fill *solar technician* positions. Specialized skills are job-specific skills that employers are requesting for industry or job competency. Employability skills are foundational skills that transcend industries and occupations; this category is commonly referred to as "soft skills." The skills requested in job postings may be utilized as a helpful guide for curriculum development.

Exhibit 8: Sample of in-demand skills from employer job ads for solar photovoltaic installers, Aug 2019 – Jul 2020

Occupation	Specialized Skills	Employability Skills
Solar Photovoltaic Installers *(n=160)*	• Roofing • Customer Service • Photovoltaic (PV) Systems • Inverters • Hand Tools • Wiring	• Detail-Oriented • Physical Abilities • Communication Skills • Troubleshooting • Teamwork/Collaboration • Problem Solving

Source: Burning Glass – Labor Insights

Exhibit 9 displays the entry-level education and minimum advertised education requirements typically required to become a *solar technician*, according to the Bureau of Labor Statistics (BLS), and the educational attainment for incumbent workers with "some college, no degree" and an "associate degree" according to the U.S. Census (2016-17).

Exhibit 9: Typical entry-level education, educational attainment, and the minimum advertised education requirements for solar photovoltaic installers, Aug 2019 – Jul 2020

Occupation	Typical Entry-Level Education Requirement	Educational Attainment (Percentage of incumbent workers with a Community College Credential or Some Postsecondary Coursework)	Minimum Advertised Education Requirement from Job Ads			
			Number of job postings	High school diploma or vocational training	Associate degree	Bachelor's degree or higher
Solar Photovoltaic Installers	High school diploma or equivalent	30%	60	95%	-	5%

Source: EMSI 2020.3, Burning Glass – Labor Insights

Exhibit 10 displays the typical work experience required and real-time work experience requirements from employer job ads for *solar photovoltaic installers* over the last twelve months.

Exhibit 10: Typical work experience required and real-time work experience requirements, last 12 months

Occupation	Work Experience Typically Required	Real-Time Work Experience Required from Job Ads		
		Number of job postings	0 – 2 years	3 – 5 years	6+ years
Solar Photovoltaic Installers	None	87	76%	23%	1%

Source: EMSI 2020.3, Burning Glass – Labor Insights

Student Completions and Program Outcomes

A review of a program inventory, developed by the Center of Excellence and the 12 IEDR colleges, identified one college currently offering five solar programs in the region. The College of the Desert offers four noncredit programs and one certificate program, all coded as energy systems technology (TOP 0946.10) programs. The following are the college of the Desert's solar program titles:

- Residential Solar (Certificate)
- Residential Solar Installation (Noncredit)
- Residential Solar Surveying and Planning (Noncredit)
- Solar Battery Storage Installation and Maintenance (Noncredit)
- Solar Site Planning Project (Noncredit)

In addition to the five solar programs within energy systems technology, Desert offers seven other programs that utilize this program code. Due to the numerous energy systems technology programs offered at the College of the Desert, it is currently not possible to determine which program issued the one award, granted from 2016 to 2019.

Community college student outcome information based on the selected TOP code and region is provided in Exhibit 11. Please note, that outcome information accounts for all programs within energy systems technology and is not specific to solar programs. Dashes indicate that there were too few students to obtain accurate program outcome information.

Exhibit 11: 0946.10 – Energy systems technology strong workforce program outcomes

Strong Workforce Program Metrics: 0946.10 – Energy Systems Technology Academic Year 2017-18, unless noted otherwise	College of the Desert	Inland Empire/Desert Region	California
Unduplicated count of enrolled students	37	47	945
Completed 9+ career education units in one year	32%	26%	37%
Economically disadvantaged students (2016-17)	89%	58%	59%
Students who earned a degree, certificate, or attained an apprenticeship	-	-	57
Transferred to a four-year institution (transfers)	-	-	29
Job closely related to the field of study (2016-17)	-	-	67%
Median annual earnings (all exiters)	-	$28,522	$34,768
Median change in earnings (all exiters)	-	-	15%
Attained a living wage (completers and skills-builders)	-	-	58%

Sources: LaunchBoard Community College Pipeline and Strong Workforce Program Metrics

Other Solar Programs

While the College of the Desert was the only college in the region that historically provided solar training programs, there are new and related training programs that may provide the educational foundations for the solar technician workforce. Program outcome data is not available for these new and related solar programs. The new and related training programs are listed below:

- Chaffey College offers a Photovoltaic Installation introductory course that serves as an introduction to the solar, energy, and power industry.
- Norco College offers a Green Technician noncredit program that prepares students to work with renewable energy systems, such as solar power, through understanding electrical systems.

- Palo Verde College began offering the Solar Technician Certificate program in the 2020-2021 academic year. This program aims to provide students with a comprehensive understanding of solar photovoltaic installation as well as the health and safety implications of the solar industry.
- San Bernardino Valley College began offering a Zero Net Energy Certificate program in the 2020-2021 academic year. This program is designed to offer students a broad overview of the energy industry; preparing students for employment as Energy Auditors, Energy Consultants, Green HVAC Technicians, and Solar Residential Technicians.

Recommendation

The Community College energy systems technology (TOP 0946.10) program prepares students for employment as solar technicians though the instruction of theory and methods of energy conservation, including alternative energy systems. Students completing this program should be qualified to enter employment as the *solar photovoltaic installers* occupation. This occupation is expected to have 118 annual job openings over the next five years in the Inland Empire/Desert Region. The *solar photovoltaic installers* occupation offers a median hourly wage of $19.03 per hour, above the $18 per hour "good wage" established by the Brookings Institute, but only if the job offers benefits. According to state research, benefits vary based on employer size, with larger employers more likely to provide benefits such as medical, dental, life, and vision insurance. This occupation is below the self-sustainability standard for a single adult with one child, $21.78 per hour. Most employer job ads were looking for a candidate with a high school diploma or vocational training.

One regional college offers instruction in the energy system technology programs. It was not possible to determine the educational supply due to the numerous energy systems technology programs offered under the TOP code. One award was conferred between 2016 to 2019. Four other regional solar installation programs were identified, educational supply details were not available.

The COE recommends creating new or expanding existing energy systems programs to meet the regional need for more workers in this field. Colleges should partner with relevant employers to ensure students have the required skills to earn a wage that meets or exceeds the self-sustainable hourly wage of $21.78 per hour. Employers offering less than the self-sustainability standard should at least provide an hourly wage above $18 per hour in addition to benefits.

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Methodology and Data Notes

Community college student outcome information is from LaunchBoard and based on the selected TOP code and region. These metrics are based on records submitted to the California Community Colleges Chancellor's Office Management Information Systems (MIS) by community colleges, which come from self-reported student information from CCC Apply and the National Student Clearinghouse. Employment and earnings metrics are sourced from records provided by California's Employment Development Department's Unemployment Insurance database. When available, outcomes for completers are reported to demonstrate the impact that earning a degree or certificate can have on employment and earnings. For more information on the types of students included for each metric, please see the web link for LaunchBoard's Strong Workforce Program Metrics Data Element Dictionary in the References section (LaunchBoard, 2020a). Finally, employment in a job closely related to the field of study comes from self-reported student responses on the CTE Employment Outcomes Survey (CTEOS), administered by Santa Rosa Junior College (LaunchBoard, 2020a).

Job postings data is limited to the information provided by employers and the ability of artificial intelligence search engines to identify this information. Additionally, preliminary calculations by Georgetown Center on Education and the Workforce found that "just 30 to 40 percent of openings for candidates with some college or an associate degree, and only 40 to 60 percent of openings for high school diploma holders appear online" (Carnevale et al., 2014).